CHIMERAS IN GRAINS OF MAIZE.

Three grains of maize showing chimeras in which the endosperm characters sugary and starchy are involved. (Fig. 5a, b, c.)
A color chimera in an F2 grain of sweet maize. (Fig. 5d.)

of the leaves growing on the tree which produced the fig-chimera were characterized by white areas or sections, as shown in Fig. 4. Many examples of this kind of chimera have been demonstrated. Norton was able to trace a foliage color difference down the stalk as a different colored stripe in a whole branch of a tomato plant, narrowing until its origin was apparently located in a single cell. Buds pushing out at the point of union between the stripe and the normal colored portion of the stem bore two-colored leaves similar to the fig leaf in Fig. 4.

If we use the mutation hypothesis to account for a change in color in a portion of a corn grain, it would appear reasonable to expect that mutations might occur in factors affecting other chemical constituents of the endosperm. Grains of corn showing such changes in endosperm have been found[7] (Fig. 5a, b, c) among the hybrid progeny of two other different strains. The cross between the varieties Country Gentleman (sweet) with U. S. White Dent (starchy) produced among the F_2 progeny seven grains with sweet patches in the starchy endosperm (Fig. 5a,b,c).

Among the F_2 grains derived from the one shown in Fig. 1a, a half purple and half white sweet grain was found, to which a great deal of interest is attached, because in this grain lies the possibility of our being furnished with the proof that the mutation hypothesis here given is the correct one. If the progeny from this grain (Fig. 5d) gives evidence that the embryo is homozygous for the purple color, then the change from purple to white in the aleurone can only have come about by somatic mutation in the manner herein de-

[7] Furnished by Dr. R. E. Clausen.

CHIMERA IN A CANNA LILY

A canna lily of the purple or bronze leaved red flowering variety in which a change took place apparently in a cell or cells of the root at the point where the bud pushed out, causing the chimera in the stem, leaves and flowers. Areas of the bronze leaves changed to pure green and flower color changed from red to yellow. The open flower on the left side of the stalk is half red and half yellow. (Photograph by courtesy of Professor W. J. Pope, University Farm, Davis, Calif.) (Fig. 6.)

scribed, while on the other hand, if evidence is furnished that this F_2 grain is heterozygous for purple and for non-purple (white), no violence will be done to our mutation conception of the origin of the chimera.

SUMMARY

Grains of hybrid corn are here reported in which xenia occurs only in a portion of the aleurone layer, others having sweet patches in the starchy endosperm. Evidence is furnished disproving the theory of independent development of the second pollen tube nucleus and the endosperm nucleus. A factor mutation occurring in a single somatic cell, producing a chimera, is offered as the more probable explanation of the phenomenon. A certain F_2 grain may furnish conclusive proof of the hypothesis advanced. Instances are cited of the occurrence of similar chimeras in several plant genera.

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The Effect of Cross-Pollination on Size, Color, Shape and Quality of the Apple[1]

W. H. Wicks, formerly horticulturist, University of Arkansas, reports the results of investigation for three years of the "Effect of Cross-Pollination on Size, Color, Shape, and Quality of the Apple." It is the second publication of a series on apple pollination problems begun at the Arkansas Experiment Station in April, 1914.

The necessity of cross-pollination of the apple has been set forth by investigators, both in this country and abroad. Considerable literature on this subject has accumulated. Data collected, also, by this station since 1914 show the necessity of cross-pollination. Growers are now aware of the importance of cross-pollination and are planting commercial apple orchards in alternate varieties. More bees are kept each year by the more progressive orchardists, as it has been demonstrated that insects, especially the honeybee, are most beneficial in promoting pollination.

Where this occurs the question arises, what is the immediate influence or effect of the pollen of the male parent on size, color, shape, and quality of the fruit of the female parent? This study was conducted during 1915, 1916, and 1917, in a typical commercial orchard at Springdale, Ark.

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[1] Monthly Bulletin of the California State Commission of Horticulture, October, 1918.

BETTER AMERICAN FAMILIES

Heredity in Its Relation to Social Selection in the Formation of Distinctive American Strains

WILHELMINE E. KEY

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HISTORIES have hitherto been written as though the genius of a nation were something mysterious, impersonal, which inheres in its constituent people, lifting them and their institutions to a zenith of power, and then as certainly bringing to them decadence and death. The life of a race has been conceived as unfolding itself in obedience to immutable law, which in the mere passage of time effects its extinction even as it effected at an earlier period of its development complete expression of its potentialities. So far as analogies from biology have been sought, we have said, in brief, "This people lives; hence it must, in due course of time, die." At the best, we assign as conceivable causes of national decline one or two outstanding facts. Thus Rome fell because of malaria or dissolute living, and Spain suffered fatal weakening through the emigration of her able men and the multiplication of her religious orders.

NATURE OF THE SOCIAL PROCESS

The facts of history take on new interpretations with the years. In the rewriting of history which the present world crisis has stimulated we witness an encouraging attempt to disentangle all the factors germane to this vital problem. In this effort the social psychologist has preceded the historian in seeking the essentials of the social process in the traits and tendencies of the individual, the influence of the environment on those traits and tendencies, and in the ideals and social standards he is led to establish. In particular are we taking account of the nation's dominating personalities, their nature and origin, the interplay of these personalities with the masses, as well as the response of the latter to the urge of ideals and traditions as represented in institutions; for institutions are nothing more than the enduring expression of the dominating personalities of the past.

From time to time in the life of a people danger signals are flung out and impassionate voices give warning of the doom that is certain to overtake persistent indulgence in national sins. From its earliest beginnings America has listened to many such jeremiads, though of late these prophets of impending dissolution have been overborne by the chorus of self-gratulation following young America's part in deciding the world conflict. Our irresistible man-power, with the spiritual reënforcement which it brought to the winning of the Great Cause, gives grounds to many for belief in the essential soundness of our national tissue, while to the less assured the war is viewed as furnishing the stimulus which shall speedily evoke new and unexpected virtue in the body politic. So, at the beginning of the Crimean War, sang Tennyson of the moral regeneration to be wrought in decadent Britain. Between these two extremes lies the middle ground of earnest questioning as to what is fundamental in the genesis and development of national tendency. What, in essence, is that process of "Americanization" which, in the space of a few centuries, has gone far to transform a heterogeneous mob of immigrants into a nation with its present rôle in world politics?

We have thus a new starting point in our interpretation of American history. That this study has for us far more than a merely academic interest is made clear by the following considerations. Whatever the present crisis may compass in bringing latent possibilities into fullest play through the stress of untoward conditions, and however it may make for national revitalization, we may not look to it to change directly the basic fabric of our society. Such change can come only through the heightening of social consciousness and the influence of this heightening on the social policies of the future.

THE DIRECTION OF THE SOCIAL PROCESS

The socio-psychic process which we know as education and, in its boarder sense, as culture, implies in the first instance efficient leadership, and efficient leadership implies balance between means and method, and susceptibility to response on the part of those who are led. In our determination of social policies it is fortunately not necessary to choose between refinement of means and methods for the development of human possibilities on the one hand, and, on the other, the increased susceptibility to response which shall give their fullest effect to these educational means. It is, however, of the highest importance that the refinements of means and method do not carry with them as sequelae a decreased susceptibility to response through deterioration in the native capacity of the individual.

It is here that we reach the heart of our problem. For deeper than the problem of educational method lies the problem of physical and mental fitness. This can be met only by care for the innate character and aptitudes of the stocks from which chiefly the elements of our population come. The phenomenal history of America is the history not only of the regnant families who formed her ideals, giving them expression in her traditions and institutions. To a far greater degree it is the history of her lesser families, drawn from some of the soundest stocks of many nationalities, hence attracted by all that America has come to stand for, and following successfully where the greater individualities led. Aristogenesis concerns itself with the origin of superior endowment, whether in individuals of superlative worth or in the mass of our citizenry who maintain successfully the standards set by persons of superlative worth. The present paper aims at a fruitful line of inquiry into the relation between aristogenesis and the social process.

SOCIAL SELECTION IN COLONIAL TIMES

It requires no careful reading of the annals of the early settlers to discount assumptions as to their universal saintliness. Came convict hordes and shiploads of adventurers; yet it cannot be denied that the majority were from the sturdy gentry and moved mainly by a desire to improve their worldly condition by honest means, with a strong leavening, particularly in New England, of those devoted to spiritual ideals. This population was subjected to a physical and social selection the nature of which can be but briefly indicated. Added to the elimination of the weak, which the shocking conditions of ocean travel entailed at that day, came the rigors of the New England winter and farther south the ravages of the malarial mosquito. In addition to this, the colonists were in constant danger of attack by the Indians. Hear the historian of Long Island: "Although the land was honorably purchased from the aboriginal owners, yet the settlers never saw a moment's rest, for fear of their dreaded neighbors. In the field a guard was kept; at night none knew at what hour the alarm would sound; to meeting on the Lord's Day they went as men prepared for instant war; every male from sixteen to sixty was a soldier enrolled in the ranks; and in proportion to its population the town could boast a larger standing army than any nation on the face of the globe." So much for the array of tests which weeded out the unfit—tests so rigid that the easy adventurer preferred to fare otherwise, and many a faint-hearted jail-bird prayed to be sent to the gal-

lows instead; but for those rich in courage, wit and hardihood, this world of new and extreme conditions furnished the supreme opportunity for dominance and the handing on of these hardy virtues to succeeding generations. Then, too, to the man who had been persecuted for his religious belief or outlawed because of revolutionary doctrines, came the opportunity, in the absence of powerful central organizations, to assert his beliefs and secure a following. Every settler was thus a peer of the realm, and as such a potential aspirant for any honor or office of the realm. The effect of this combination of factors in sifting out the able and worthy of whatever station, giving them preëminence and through this preëminence bringing about alliances which produced the quality of the regnant colonial families, cannot be overestimated.

IN THE OLD NORTHWEST

Nor are we to imagine that there has been serious limitation of this process in the conquering march of settlement westward. The early immigration to Massachusetts Bay was from the most virile stocks of Devon and Somerset. These stocks furnished the seed of self-governing New England and founded the institutions which should put the democratic ideal before every migrant to our shores. As we trace these families westward, we find their representatives leading in the establishment of social institutions, and often because of greater vigor and aggressiveness, making a short cut in social and economic effectiveness. It is a significant fact that the small state of Massachusetts furnished 115,000 men to the Civil War, but far more significant is the fact that in the quota of enlisted men furnished by a western town in the present war 23 nationalities should have been represented, each vying with every other in its resolution to defend to the last ditch the American ideal. In other words, we have had in the immigrant of yesterday a responsive sensitiveness to the social and emotional traditions for which the word "America" has come to stand. These traditions served largely to select the dominant tendencies of the immigrant and the strain from which he sprang, and these tendencies have in their turn been preserved and oftentimes intensified through union with similar strains which earlier found a home here. Running parallel with the genetic process is the educational process and all that we include under the term "social heritage." This, as already indicated, is in essence as follows: The raw contacts, with the realities of frontier existence and all that went with the phenomenal development of our virgin resources, developed resourcefulness and initiative, while the social institutions founded by our leaders, offshoots in the main from the early ablest American strains, clarified, defined and further strengthened inchoate strivings toward the American ideal.

The lesson of the persistence of defect through successive generations has been brought home to us in such histories as those of the "Jukes," the "Ishmaelites" and the "Kallikaks." Of equal significance is the study of families where, by fortunate matings, trait combinations spelling superior endowment have been effected. The story of such families will be taken up in succeeding papers.

Meet Success in Producing Seed of Sugar Beets in This Country

To reduce dependence on foreign sugar-beet seed, efforts to produce this seed in this country are meeting with distinct success. Before the war domestic production was almost at zero. In 1916 the production had risen to 5,211,000 pounds, in 1917 to 5,558,000 pounds, and in 1918 to 6,384,000 pounds, the estimate for the last year being subject to revision.

Along with this movement, the acreage planted to sugar-beets has greatly increased.—*Weekly News Letter, U. S. Dept. of Agriculture.*

NEW EVERBEARING STRAWBERRIES

W. VAN FLEET
Bureau of Plant Industry, United States Department of Agriculture

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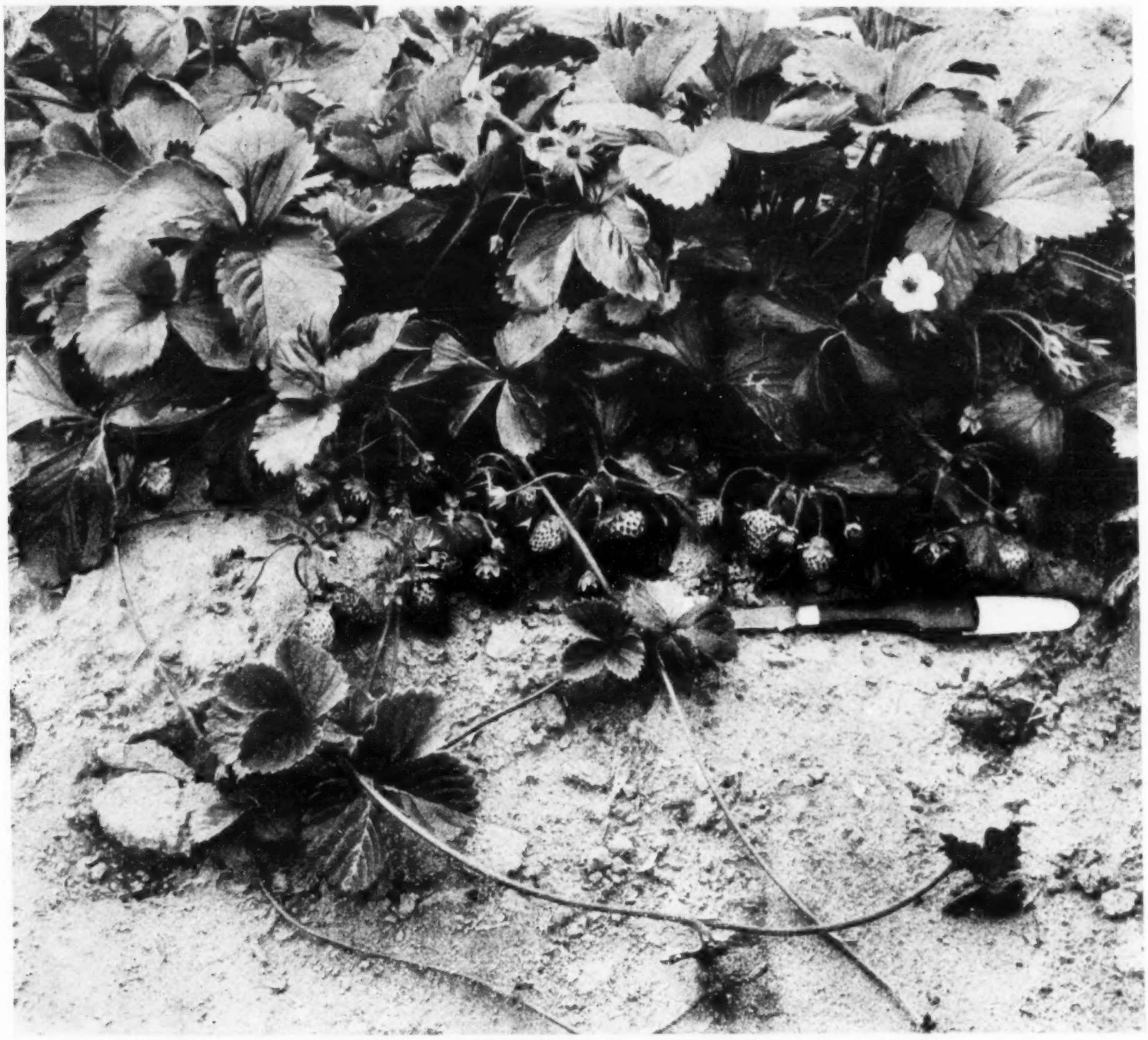
SEVERAL varieties of strawberries that continue under favorable conditions to fruit throughout the summer and autumn after bearing a fair spring crop of berries have lately come into favor. All are descendants of the Pan American, a sport or mutation of the Bismack, a former commercial variety of the *Fragaria virginiana* type in which the runners are to a great extent suppressed, favoring the successional production of fruiting crowns during the growing season. This peculiarity appears heritable in many seedlings and hybrids of Pan American, and the horticultural section thus established has been given the convenient but somewhat misleading name of "everbearing," as special cultural requirements in the way of moisture and fertilization are needed to insure fruit formation and plant increase during the most exacting summer months. Progressive and Superb are the most popular varieties of the new type and are increasingly planted. They leave something to be desired in productiveness and plant-making capacity, as few runners are thrown out from the more prolific plants. Seedlings continue to be grown from the present everbearing varieties, and crossings have been made by several growers with spring-fruiting commercial varieties and varieties of the European Alpine strawberry *Fragaria vesca,* which naturally fruits over a long season, in the hope of developing features of additional value. *Fragaria vesca* in the European and Mexican Alpine forms has rarely proved worth cultivating in North America, as the plants do not well endure our hot sunlight and the berries, though well flavored, are small and soft in texture.

While traveling in Chile as an agricultural explorer in 1914, Prof. W. F. Wight, of the Bureau of Plant Industry, forwarded seeds of a fairly large-fruited Alpine strawberry occasionally sold in the Santiago markets. The type is that of *Fragaria vesca,* but whether native or introduced could not be ascertained. When grown in the introduction gardens at Rockville, Md., and Chico, Cal., of the Office of Foreign Seed and Plant Introduction, certain of the resulting plants showed greater vigor, fruitfulness and general adaptation to our climatic conditions than any Alpine hitherto introduced. They have endured our hot, dry summers, fruiting continuously from June until frost under the most ordinary cultural treatment, at the same time throwing out an abundance of strong runners. The berries are well flavored, but lack firm texture and sufficient size to be of practical value. Plants have been disseminated in a limited way for further trial under the introduction number of 35005. The ability of this South American strawberry to fruit and produce runners simultaneously throughout the summer and autumn suggested the possibility of developing large-fruited varieties holding the same characteristics by hybridizing it with practical commercial spring-bearing sorts. Chesapeake and Early Jersey Giant were selected for the purpose as being well adapted to local conditions at Bell Experiment Plot, Glendale, Md. Pollinations were carefully made under glass in February, 1916, and the resulting seedlings grown in the field. About 400 fruited in June, 1917, showing high average merit as June-fruiting varieties, but with no obvious tendency toward continuous bearing.

Runners from two of the best plants were rooted in pots during summer,

A NEW "EVERBEARING" STRAWBERRY

This variety of strawberry continue sunder favorable conditions to fruit throughout the summer and autumn after bearing a crop in the spring. It is the result of a cross between *Fragaria chiloensis* and *F. vesca*. Photographed by Crandall. (Fig. 7.)



A NEW "EVERBEARING" STRAWBERRY

Another view of the new cross produced at Bell Experiment Plot, Glendale, Md. Photographed by Crandall. (Fig. 8.)

brought into bloom under glass early in 1917, and again pollinated with No. 33005, something over 150 seedlings resulting, four of which bore handsome, large berries continuously from July until November the past season, producing a good supply of vigorous runners at the same time. The plants shown in the illustration were photographed September 26 and continued to ripen fruit for several weeks. In appearance, size and quality the berries most favorably compare with the best of the everbearing varieties now in cultivation, while the plant-making propensities rival those of the commercial spring-fruiting kinds. If, as now appears probable, superior continuous-bearing strawberries with free runner production can be developed by the use of an Alpine variety adapted to the American climate, there will be little need to depend on the progeny of the mutant Pan American, with its inherent tendency toward slow plant increase.

TESTING NEW FOODS[1]

DAVID FAIRCHILD

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EVERYONE has his own idea of foods and will discuss it with you as long as you will listen. It forms the chief topic of conversation among primitive peoples, and yet, strange to say, so little serious attention has been given to the subject that the real bearing of taste upon food production is not suspected by most educated people.

There is a general feeling that a new food plant comes into use in some quiet, mysterious way, that belongs in the category of natural occurrences, instead of requiring the solution of many practical problems.

In the attempts which my associates and I have been making for twenty years to introduce into use in America the food plants popular in other lands, we have learned a good many things about foods and the difficulties of really testing them, and we have also caught a glimpse of certain changes which are coming in the world of food production and consumption. The thought that these experiences of ours and the deductions which we have drawn from them may interest the members of this section of the association, prompted me to accept Dr. Cook's invitation to join such distinguished company as that of my old friends Harper and Moore.

It is a complicated thing to test a new food plant; it seems simple, but it is not so. Let me give some actual experiences in illustration.

THE ARRACACHA

In 1899 I visited Caracas with my friend Mr. Barbour Lathrop and became familiar with the Arracacha, (*Arracacha xanthoriza*), *which is a* favorite vegetable among Venezuelans. I ate it poorly prepared in a hotel there, but believed, nevertheless, that it had possibilities. My friend was rather indifferent to it. I interviewed old Dr. Ernst, a German botanist, who had spent many years in Caracas, and he was enthusiastic in his praise of it. How could it be decided whether my friend's epicurean judgment, Dr. Ernst's, or my own, in regard to the vegetable, was correct? I decided that my own guess was as good as my friend's, and that when the vegetable was better prepared, and he again had a chance to taste it, he might change his mind. There were no other Americans in Caracas whose opinions I could get. The vegetable could not be sent to the United States, for it would rot on the way. The only alternative was to get sets[2] of it and grow them in some part of the United States. I had not seen the plant growing, so I went into the interior and saw it as it is grown there in the door-yards, and photographed it under difficulties. The sets failed to survive the voyage. I imported them again in 1899 from Jamaica, in 1905 from Porto Rico, in 1909 from Panama, in 1910 again from Caracas, in 1911 from Panama and Caracas, again in 1912 and 1913 from Caracas, and in 1916 from Jamaica and Venezuela. Sometimes they died in transit, sometimes they refused to grow after being injured by the necessary fumigation, and sometimes they were killed by neglect or frost in the field tests. At last Consul Brett of La Guaira sent me a lot of fine sprouts or sets, and, coinci-

[1] Address before the Botanical Society of America and Section G of the American Association for the Advancement of Science, in Baltimore, December 26, 1918.

[2] Young plants fit for setting out.—ED.

A TABLEFUL OF NEW FRUITS AND VEGETABLES

These were all gathered at one time at the Plant Introduction Field Station at Brooksville, Florida, and represent samples from the somewhat extensive trial plantings there. They were gathered for culinary tests. Reading from left to right their native names, common enough in the countries from which they come, are Cassava, Dasheen, Yautia, Yautia leaves, Paitsai, Tamopan Persimmon, Soy Beans, Bermuda Arrow-root, Edible Canna, Water-Chestnut, Chayote, Roselle, Arracacha and Botor. (Fig. 9.)

dent with their arrival in America, Mr. Morrow, a very unusual plant propagator, was stationed at our introduction garden in West Florida. The imported plants were potted and grew and were sent to Mr. Morrow, and last year he forwarded to Washington a root of the Arracacha which, because it was the only one, and a curiosity, never got into the soup. It was only a few weeks ago, after twenty years of waiting, that I had the pleasure of digging, cooking and eating, under the circumstances of American life, the Venezuelan Arracacha, and of demonstrating to the satisfaction of a number of Americans that it is a desirable vegetable. Ernst declares it is superior to the best potato. Barrett says it always sells for a good price in Porto Rico. Schultz says it resembles a cross between potato, celery and asparagus and is roasted, fried or baked in Panama. Lara says it furnishes a nutritious flour used for invalids in Venezuela. Masters says its flavor is intermediate between a chestnut and a parsnip. How desirable the Arracacha is in comparison with other vegetables will require years of patient work to determine, for first of all we must find out whether the variety we have is the best there is when grown in America, whether the characteristics of season, hardiness, productivity, keeping qualities and shipping quality will give sufficient advantage over other vegetables with which it comes into comparison to make it remain in our gardens. Into the problem now will enter such questions as the following: Who is it that says the vegetable is good to eat? Has he good taste in vegetables? Where does the matter of learning to like a new flavor or texture come into the question? What influence has the manner of preparation of the vegetable on its palatability? Has it a character which will make people crave it, or will they be indifferent to it, confusing it with something else? Then there are the long "waits between drinks," so to speak; periods between the seasons during which one cannot have the vegetable to taste—in most cases nine or ten months. But these are only the beginnings of the difficulties, for there is another whole set of them.

To test a new food plant with the object of getting your countrymen to take up its culture means, as I have said, that you must get the best of its kind. But how can this be done? If you take the opinion of the foreign people who grow the various varieties, how do you know their taste is like that of the American in the matter of foods? The Chinese do not like soft berry fruits, such as raspberries, and prefer to eat their stone fruits while still hard; they eat their rice without salt; they do not like butter nor milk, because it smells too strongly of the cow; they are not, as we are, absurdly fond of sweet candy (they find it too sweet); they cannot understand how we can bear the flavor of tomatoes, nor why we don't all like the flavor of their soy sauce instead of meat gravy. Evidently their opinion of the best variety of soy beans may not be ours, so the only thing to do is to collect all its varieties which can be secured and test them side by side. We brought into America over a thousand varieties of soy beans, and Mr. Morse, the soy bean expert of the Department of Agriculture, has selected perhaps a dozen or so of these beans which, in his opinion, are superior to the others in flavor or in some characters of earliness, productiveness, and usefulness for special purposes. Mr. Young, the dasheen expert of the department, grew over a hundred varieties of the taro before he found the Trinidad dasheen, the Pat Long Fu, the Yatsugashira, the White Sprout, and the Belembe—special varieties of a vegetable which is grown and eaten in one form or other by millions of people throughout the tropics. Mr. Hume has in his collection in Florida at least fifty varieties of the Kaki (the Japanese and the Chinese persimmon), but, I understand, that he is enthusiastic over only three or four. In the case of wild fruits which have not been selected by man, the problem is still further complicated, because the mistake is so universally made of condemning a species

A SINGLE SOY BEAN PLANT LOADED WITH PODS

This bean (*Soja max*), unlike any which Americans have grown, until quite recent years (except as a fodder plant for livestock) has been for many centuries one of the great food plants of China and Japan. There are many hundreds of varieties, some being grown for oil and others for the making of vegetable cheeses, and from others the great flavoring sauce "Soy" of the Chinese and Japanese is made. The use of this palatable, nutritious sauce might be justly compared with the use of gravies among occidentals. (Fig. 10.)

to oblivion without considering the fact that one has tasted only a rank, worthless seedling. I have tasted North American pawpaws (*Asimina triloba*) which are as deliciously flavored as the finest cultivated annona of Maderia, but most people have tried only the rank-flavored, worthless seedlings. As a result, our largest, finest native wild fruit has remained for four centuries practically untouched by the horticulturists of America. The watery, tasteless seedling avocados (foolishy called alligator pears) which a few years ago came into the markets of New York and Philadelphia from Columbia are not to be compared with the selected grafted varieties of Florida and California, and their sale is doubtless responsible for many people's dislike for or indifference to the most remarkable of all salad fruits. Many seedling mangos are so strong in turpentine that only one who has formed the habit of eating the mango really enjoys them. I once had the experience of changing completely the opinion of an American millionaire who had traveled hurriedly through India, the land of the mango, and who had formed a very unfavorable impression of that wonderful fruit, by tasting some poor turpentine variety, by giving him a delicious mango variety from grafted trees in Florida.

So it is necessary to bring in and grow all varieties possible in order to select the best for the American palate. But it is not enough to grow a single plant of a kind in botanic garden fashion. Practical experience has shown us that a test of a variety requires the production of many bushels of the fruit or vegetable. My friend, Mr. Lathrop, took me down the coast of East Africa purposely to get a special mango which he had eaten and liked. When it first fruited years later in Florida, it proved so disappointing in size and flavor as to arouse a good deal of ridicule. By accident, however, a number of trees were permitted to live and bore large crops of fruit, and they came to be appreciated highly by those who could get them. For years we tried to decide whether the various dasheens were really good vegetables by growing a few hills of each kind; but we discovered that by the time we had tried the tubers of the dasheen in various ways on even a very small group of people to get their opinion, the supply was gone and the season was over. We have been forced to grow acres of it, and repeat the culture year after year, in order to weed out the undesirables and make sure we are keeping only the best from every point of view.

When I tasted for the first time a Chinese jujube, on a French steamer off the coast of China, I liked it immensely and made up my mind that the Department of Agriculture should get it, but when I mentioned the jujube to some of my colleagues of the department, I was taken to a worthless seedling growing in the department grounds and told that it had been tried but wasn't fit to eat. Only since we have planted an orchard of twenty odd distinct varieties of Chinese jujubes, and gathered hundreds of pounds of their fruit and candied them, have we been able to make an impression upon our audience and prove to many that the jujube rivals the date in delicacy of flavor.

The Paitsai, a Chinese species of mustard, has been grown in the gardens of the country for many years without much progress, but the production of 20,000 boxes of it recently and the rapid rise in popularity of the Cinese restaurants, where it is so largely used, are giving it a test of the proper proportions.

THE MANGO

But large quantities are necessary, not only to determine the best varieties, but also to enable one to find out whether many people will like a new thing or not. In the early days, when a single mango (the first of its kind to be produced) was sent in from one of our test gardens, I remember with what pride I took it to our then Secretary of Agriculture, and presented it to him. Neither shall I ever forget the disappointment when I learned that one smell of it was enough, that he gave

A FIELD OF SOY BEANS, THE GREAT CHINESE CROP, IN MARYLAND

The harvesting machine has been over the central rows and has beaten out the beans from the pods. Although the problem of machine harvesting of soy beans has not been solved with complete satisfaction, enough has been done otherwise to assure this leguminous crop becoming a most important one for cultivation in America. Its roots are covered with nodules of nitrogen-gathering bacteria. The crop from this field will be used by the Department of Agriculture to stimulate the cultivation of the soy bean by farmers and its use as a food by householders. (Fig. 11.)

it to one of his friends, that this friend tried it on his family, who passed it on to the colored man that cut the grass; the colored man gave it to the chickens, and they all declined to like it—my precious and only mango, which I knew Englishmen in India would rave over! The experience was a crushing disappointment. I had taken the mango to the wrong market. It took me some time to realize that the man in authority over one is the very last man that one should prejudice against one's work by trying to get him to eat a new fruit. Had I been able to give the same variety of mango to scores of people and compare their opinions, I would have discovered that there are people everywhere who will, as well as some who will not, like any given new fruit or vegetable. I would have received encouragement and gained much confidence by finding that for every person who disliked the mango, there were a dozen who liked it, and a half-dozen who were enthusiastic about it.

I made a test of the mango last summer. I sent some of the finest flavored fruits I have ever eaten to five ladies, wives of Cabinet officials, and at the same time I served the same or equally good varieties at the Cosmos and Press Clubs of Washington. One of the Cabinet ladies remarked, in regard to those which I had sent her, "I am very sorry, but we did not like the mangos." Another said, "I am deeply appreciative of your remembering us, and I was tremendously interested in the mangos, but I am constrained to be perfectly frank and tell you that we did not like them. It is just possible that they are one of the foods for which one could cultivate a taste, but it apparently is not a natural one with any member of my family." Another of the ladies remarked, "We found the mangos which you so kindly sent most delicious. This fruit would add exceedingly to our list of edible fruits." Another replied, "The mangos were perfectly delicious. Never in Mexico did I eat better, and I am delighted to know they are being grown in this country, for now they will be in the market here." Still another of the ladies who had eaten the mango before reported, "But, really, I never ate such fine mangos either in Mexico or the West Indies." Can you imagine the cold chill which settles down on a pioneer when he first starts out with a new fruit if, early in its history, he runs into a "throw down" such as two ladies of such prominence socially have given him, or how his spirits rise when he finds that three out of five are of quite the opposite opinion, or how he begins to see things differently when he makes a trial such as I made last summer in the Cosmos and Press Clubs of Washington and discovers that out of eighty-five who tasted the mango only four diliked it and that there were a large proportion of them who pronounced it delicious. Only one condemned it with the words, "It is too sweet. I dislike the flavor." I once opened a delicious mango and showed how it should be eaten, to the manager of the famous Touraine Hotel, and he turned it down as something his guests would not like. Therefore they never got a chance at it. So far as the mango is concerned there is no longer any doubt in my mind that most of those who do not like it could easily acquire the taste for it if they cared to overcome their prejudice against it.

Think what the eating of an orange means to a child, the peeling of it, the separation of the segments, the disposal of the seeds and indigestible fiber, the oil which covers his hands and poisons his mouth if he tastes it. I can still remember the oranges of my childhood, and as I look back upon them the eating amounted to a ceremonial. Today, even, the eating of an orange on a Pullman is not an easy thing to do gracefully. We forget these things and try, without the preliminary instruction, to get people to eat such a fruit as the mango or the Japanese persimmon and are surprised that the public laughs at us.

The story is told, and I believe it, of an Englishman of the seventeenth century (tea was so rare at that time that it was a privilege to be allowed to touch the tongue to a few leaves of it) who,

PICKING CHAYOTES IN FLORIDA

Before a new vegetable like the Guatemalan chayote can be given a fair trial it must be grown on a considerable scale and its advantages and disadvantages studied from various angles. Its productiveness per acre, its liability to disease, the season of production, its storage qualities and the recipes which will bring out its particular character all require the elements of time and quantity. With only a few vines, these factors cannot be satisfactorily determined. In texture the Chayote appears to be unexcelled by any other vegetable. It will carry any flavor imparted to it by gravies or sauces or by pickling. (Photograph by Fairchild. Brooksville, Fla. Nov., 1918.) (Fig. 12.)

when asked by a friend, who had given him some Russian tea, how he liked it, replied, "Well, you know we found it a trifle tough." He had tried to eat the leaves! A friend of mine recently took an avocado (alligator pear) up from Florida to New England as a present to his people. "Of course, they knew how to serve it!" In the middle of the dinner, as the salad course was approaching he was called into the kitchen to show how the avocado should be served, and he found that the cook, in trying to peel it, had let it slip out of her hands on to the floor, and, in trying to cut it in half, struck the stone and was trying to cut that with a hatchet. Yet this is the staple food of millions of Guatemalans who can no more imagine intelligent people having difficulty in eating an avocado than we have in imagining how one should eat an apple.

I think there is no doubt but that the difficulties of preparing good corn bread have stood in the way of the use of this excellent food by the peoples of Europe, just as our ignorance of how to cook rice properly has prevented our consumption of that cereal from exceeding 7 pounds per capita.

We have underestimated the size of the task. To plant a tree of a new fruit in a botanical collection and expect the public to take it up is a good deal like making a new tooth powder in a test tube and waiting for a demand for it to spring into existence. In the Pinchin Garden in Rome stands an avocado tree over one hundred years old, and the only people who gather the fruits are the members of the Mexican Legation.

THE CHAYOTE

Take the chayote as an example. A few French descendants near New Orleans, Charleston and Savannah have for many years grown with varying yearly success a small patch of what they there call the Mirliton, or mango squash. They have generally sold what they grew, but the demand has not increased. Only a very small circle of the fashionable people knew it, and those who were not fashionable hesitated to try it. We have taken up its cultivation on a larger scale, and we find that instead of a few plants we need at least an acre of trellises and hundreds of vines, and we are planning for the production of a thousand bushels of the fruits which, with the most carefully thought-out literature to accompany it, will be sent out to the commission houses and the public generally. Hundreds of bushels have been so distributed this year and last, with two results—a growing demand by the trade on the one hand and, on the other, a local interest in them by people who could grow them in their own yards for their own use. The propaganda lifts the vegetable from the rank of a curiosity which "neighbor Jones is growing" and puts it where it belongs, as a perfectly good vegetable with certain characteristics, distinguishing it from all others and making it a valuable addition to the table.

Much fun is poked at the Florida "Cracker," but, after all, it must be admitted that we owe the grapefruit to his open-minded attitude towards new foods; whether born of the necessity of isolation or not, is another question. If canned fruits had been cheaper and easier to get in the early days in Florida, perhaps we would not have the grapefruit at all.

But, after all is said, perhaps the greatest obstacle to a satisfactory testing of new foods lies in two curious facts. It seem to be human nature to ridicule a food which one does not like oneself, and to attribute health-giving or disease-producing qualities to the food one eats. This is not only an individual trait, but a universal one.

Upon the walls of a quaint little hotel in Doylestown, Pa., I found in my bedroom last year an interesting old woodcut depicting the departure of the French soldiers for England, and under it were these lines:

"With lantern jaws and croaking gut
See how the half-starved Frenchmen
strut,
But soon we'll teach those bragging foes
That beef and beer give heavier blows
Than lamb and roasted frogs."

A WEST INDIAN YAM

A freshly dug Yam (*Dioscorea alata*) still attached to the vine, from the Yam patch of Mr. O. P. Wernicke of Brooksville, Fla., who has going this starchy tuber producing vine regularly for ten years, and Mr. Wernicke and his family have become as fond of these Yams as they are of potatoes. When the War Trade Board was obliged to restrict exports of wheat to Trinidad, the Yam came to be grown extensively and became a popular vegetable there. When cooked and properly prepared it resembles mashed potatoes and is a delicious table vegetable. (Fig. 13.)

A similar attempt to maintain the superiority of our own national food appears today in the writings of some of our foremost food chemists. Osborne attributes the drift of the Japanese toward our menu to an instinctive craving for a higher protein diet, but just how he arrives at such a conclusion I fail to understand, since the Japanese have copied our hats, our umbrellas, our shoes, our coats and trousers and even our furniture, and certainly there is nothing instinctive to be found in these imitations on the part of a smaller for the habits of a greater, more powerful nationality. Even McCollum, in his excellent book, makes the statement, unsupported by any carefully considered evidence. I am afraid that the peoples who drink milk and eat butter and meats are larger than those who get their "fat soluble A" from green vegetables. Galton's studies on the inheritance of height represents the method, it seems to me, that it will be necessary to follow to arrive at any satisfactory conclusion on this subject, and I am disposed to consider the statement as an expression of an idle notion and a neglect to consider the rôle played by heredity.

The pigmies of Africa live side by side with the normal sized blacks—do they eat different foods? The Terra del Fuegans are a large race—is their size determined by their food?

As I have said, to ridicule a perfectly good new food by comparing it to some food stuff used for the lower animals is perhaps the commonest form of ridicule. I cannot consider it as anything but foolish and short-sighted that the Irish should have come to look upon corn-meal as "food fit only for hogs," Only the feeblest propaganda has been raised against such an attitude. Our wheat shortage during the war rose in part at least through the inability of Europeans to eat our corn, and when I look for signs of any advertising to teach them, I find that none worth mentioning was ever made. When the war came it was perhaps too late. "Corn-meal" Murphy was not financially supported. He was like John the Baptist, crying in the wilderness. He complains that he had to give up because he could not raise the funds, and Dr. C. V. Riley, then Assistant Commissioner to the Exposition, in refusing to help him stage a corn show at the Paris Exposition, pleads the usual lack of appropriations.

Ridicule of new foods has hindered their proper testing, and magazines and newspapers still have funny writers connected with them who fail to see anything great in the attempts to introduce new food plants. They make fun of the avocado as a rich man's food, though it is the food of the poorest *cargador* in Guatemala, and of the dasheen as a bearded potato, though it forms the food of millions where the potato cannot be successfully grown.

In Panama, the natives back from the coastal ports give as an excuse to their guests for not having any vegetables, the fact that they are too far from the coast, where the potato is imported. It is the fashion to eat imported potatoes in Panama just as it is the fashion to eat French bread (*El Frances*) in Guatemala, even though potatoes do not grow well in Panama and wheat doesn't grow at all in Guatemala. These are serious questions, and they deserve a much more serious consideration by agriculturalists and educationalists.

I have no wish to discuss with individuals whether they should or should not eat cheese or ice cream to excess or drink coffee—these are questions for disputation and are generally fruitless —but I do maintain, as the result of twenty years of study and experimentation, that the question of testing new foods must and will go on to a broader basis than it hitherto has occupied. When it does, I believe we will find that the greatest, most progressive races will reach out after all kinds of foods that are good; and with the same hospitality of mind which has characterized the Americans in their adoption of new labor-saving machinery, I believe our countrymen will test with interest many new foods and learn to use so many kinds that it will be profitable to grow those best adapted to each agricultural

region and season, because there will be the necessary demand for them. How far the change from one food to another is essential to health is a question for the dietitians to settle, but I do insist that the whole question of testing new foods must rise from the slough of foolish neglect, where it remained almost from the time of primitive man, to the plane it deserves to occupy, for, after all, we are not certain we have the best. We know a few food plants cannot grow everywhere, and the whole drift of evolution is towards a greater variety of all things—foods as well as other things.

New foods (new species, not only new preparations) must, and I believe will, be tried out on as great a scale as that which characterizes the advertising campaigns for cereal foods. When that time comes many of the new plant foods will come into their own and compete with the old and form natural agricultural monopolies where they grow the best.

We would indeed be supine if, blind to the lessons of this great war, we dropped back into the same old rut in our education with regard to the rôle which is being played in agriculture through the foolish, unreasoning and unjust popular ridicule of the great foods of the world. Narrow-mindedness in the food habits of the people is as much to be avoided as narrow-mindedness towards labor-saving machinery or towards morals or government or religion. The restricted menu affects the essential function of eating and so effects the adaptability of the species and hinders its evolution.

Racial Problems and World Problems

A recent meeting of the newly formed Galton Society took place in the American Musum of Natural History. It was preceded by a luncheon at which the members present were the guests of Professor Henry Fairfield Osborn and Mr. Madison Grant. The following members and guests were present: Professor E. G. Conklin, Mrs. William H. Crocker, Dr. C. B. Davenport, Dr. Gregory, Mr. Madison Grant, Mrs. E. H. Harriman, Professor Huntington, Professor McGregor, Professor Merriam, Professor Osborn, Dr. Lothrop Stoddard, Professor E. L. Thorndike, Dr. Wisslor, Dr. F. A. Woods.

Professor Merriam, of California, spoke of the place anthropology should hold in the universities. In order to make the discussion concrete, he gave a brief outline of the history of the anthropology in the University of California. When the department was started everyone thought best to begin with the local anthropological problem, in other words, with the study of the California Indians. Under Professor Kroeber this work has been carried to a very satisfactory conclusion and, while a great deal more work could be done, it seems that a point had been reached where new problems should be undertaken. The speaker thought this was typical of anthropology in America. Everywhere the feeling had been, and rightly, that attention should be given to the problems at hand. The result is that we have a very systematic body of knowledge concerning the North American Indians, but have no contributing workers in larger anthropological problems. The effect of the world war and its broadening influences make it highly desirable that anthropology should be put upon a broader and more fundamental plane, particularly should it deal with problems concerning our own racial and national antecedents. The broadening of anthropology would also require the drawing in and coördination of much that has been done in psychology, biology, neurology and history.

THE FIGHTING ABILITY OF DIFFERENT RACES

Letter from an American Officer, with Comments by John Jay Chapman and Henry Fairfield Osborn

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NO ADEQUATE scientific studies have ever been made on the comparative fighting ability of different races. The "warring instinct," or gregarious group-instinct, is something quite apart from any desire to fight single-handed, to quarrel with one's neighbors, to go about with a chip on one's shoulders, or to start trouble out of nothing. The most polite and peaceful morals may make the best soldiers under the stimulus of group conflict.

The readiness of nearly all peoples to respond to this group-instinct for war is not difficult to explain on grounds of heredity. Mankind has been devoting presumably half of its time to warfare, so that any groups lacking that instinctive tie that binds so marvelously one to all, would, by and large, have been hacked to pieces by more unified and organized groups. Or, in other words, those groups, compounded in the patriotic mold, with a maximum display of bravery and individual self-sacrifice, would survive as such, and in the long run exterminate less closely formed aggregates.

The disposition to act in a quarrelsome manner, to fight singlehanded, to murder, or to disturb the harmony of the social order represents a type of man that has been acted upon by natural selection in precisely the opposite way. Ever since human beings have lived in settled communities, persons of this sort have been seized upon by society and summarily dealt with, so that to a great extent these types have been eliminated. [1]

The willingness and, indeed, enthusiasm with which so many nations entered into the recent great war, as soon as the gregarious instinct reached a certain point of contagion, would seem to indicate the general or widespread distribution of the warring impulse. The countless evidences of bravery and marvelous self-sacrifice that have reached us from all quarters might give the impression that all people are equally brave and that there is little difference in the value of the fighting ability of different races.

This may or may not be true; but in the absence of systematic knowledge on this important question it is at least interesting to read the following letter contributed by Mr. Madison Grant, whose recent "Passing of the Great Race" has extended an interest in the applications of the study of heredity.

This letter was written to Mr. Grant by an officer who had become interested in racial questions and who evidently thinks that "blood will tell." It is published here in full recognition that it is merely the testimony of a single individual.

Mr. Henry Fairfield Osborn, who also sent to the JOURNAL OF HEREDITY a copy of this letter, has added some comment on the questions involved and has answered a criticism raised by Mr. John Jay Chapman.

HEREDITARY AND ACQUIRED FIGHTING ABILITY

American Museum of Natural History,
December 26, 1918.

For the "Journal of Heredity"

The following opinions, formed by one of the American artillery captains

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[1] A fuller discussion of the results of warfare on human evolution, through the processes of natural selection and survival, may be found in "Is War Diminishing?" by Woods, F. A., and Baltzly, A., Boston, 1915.

in France, has some bearing on the racial distribution of the readiness to fight and of physical courage:

"It is interesting to learn about the relative fighting ability of the various races in this game. The Norman and Breton Frenchmen and the North French generally are the fighting men of France. Today they compose practically all the fighting troops left. The Scotchmen are the top-hole fighters of them all, Boches and Allies, and that seems to be admitted by all alike, while the Italians of certain divisions are utterly unreliable. A fighting Italian is as scarce as the dodo bird, in spite of all the newspaper bull to the contrary. . . . They are used entirely for road building and stevedore work about as far back of the lines as they can get. Some French troops told us that the Italians took over the sector we left between the Vesle and the Aisne when we pulled out of there, and in two days they lost practically all that we had won across the Vesle and were being walloped soundly by the Boches.

"There is not a bit of use denying that the Boches are brave men and fight like heroes. Their aviators are the finest fighters of the lot, with the exception of the British, perhaps. But how anyone can show greater sand or finer dash than the Boche aviators, I cannot understand. They may be devils, but they are fighting devils and have guts through and through. Between them and the Italians give me the Boches every time.

"As for our own troops, their fighting ability is in direct proportion to the Americans in the various units. Get a draft outfit filled with the kind that is swept up around our east side and it is just about as unsafe as anything in the Army; given an outfit like the Yankee division, or some of them with a full proportion of Americans, and there is nothing they are afraid of, nothing that will stop them short of death itself. In fact they're too darned brave if anything. That idiotic 'melting pot' idea is blown to the devil by this war if they tell the truth about the thing. But it is ten to one bet that they will lie and smooth the matter over in such a manner that you all at home will believe that anyone with an American uniform on is as good as another similarly dressed. Fighting men are born that way; you cannot drill the real stuff into anyone at all.

"I think that the Southerners and the New Englanders are the best of our lot, with no choice between the two. But you really cannot hand the palm to any of the Americans; they are all equally full of the greatest spirit that any man ever saw in war.

"I have seen no negroes fighting and have heard very different reports of them, but the experience of the French and British is that the lower races cannot stand the strain of this war, particularly shell fire, which is the hardest thing of all on the morale of troops. And I do not imagine that they are very good fighting troops, though they are invaluable as working troops, and one sees thousands of them everywhere on the roads right back of the lines and from there back to the docks at Brest itself."

The above, from a letter not intended for publication, is more or less confirmed by other observers. Of course it does not take into account the influence of training. It is an open secret, however, that in the first battle of the Marne, it was the men of Mediterranean race from the south of France who gave way and had to be rallied and replaced by sterner material from the north of France.

JOHN JAY CHAPMAN'S COMMENT

It is interesting also to see the comments on the above letter by a distinguished man of letters, Mr. John Jay Chapman, who does not believe in racial values in psychic qualities:

1. "Many thanks for letting me see the enclosed. I don't doubt that some races fight better than others. But I doubt whether you can scheme to preserve any particular race without doing more harm than good. If you accept the test of *survival* as the best test of a race, why it's only scientific to let the

matter alone. How do you know which one *ought* to survive? That's the very question you are trying to find out. You might as well put weights in the balance in weighing chemicals.

2. "The notion that we must boost up any race which is failing or assist nature in any degree violates the whole theory of the survival of the fittest.

3. "As for *which* race makes the best fighters, look at the Germans (whom the correspondent praises so highly) and see how they collapse. I don't think the world will regard the German civilization as efficient or the Germans as good fighters for some time to come.

4. "What basis are you going to get down to in *encouraging nature?*

6. "If modern science has discovered a formula that will tell us how to begin, I don't know the formula. This desire to help things along is a moral idea which science has borrowed from religion and ethics, etc., and which science can make use of in small matters, like hygiene. But the idea is unscientific or non-scientific, and I rather believe that it cannot be expressed in purely scientific language."

Considering the above report by one of our artillery captains, and the comments of Mr. Chapman, it must first be observed that it is extremely difficult to distinguish between hereditary and acquired fighting ability, the former an inborn predisposition, the latter the result of education and social environment. The matter is also one of averages rather than of individual instances and exceptions. Here, as well as in every other field of genetic inquiry, we must sharply distinguish between race and country.

An attempt is being made by members of the Galton Society to encourage a more precise physical and anatomical definition of the Nordic, Alpine and Mediterranean races respectively. Doubtless psychic definitions, or inventories of dominant and widely prevailing psychic traits and predispositions are equally important to place the races distinctively on a genetic or heredity basis.

HENRY FAIRFIELD OSBORN.

American Physicians Should Follow Suit

December 4, 1918.

THE AMERICAN GENETIC ASSOCIATION,
511 Eleventh Street N. W.
Washington, D. C.

GENTLEMEN:

For the past seven years I have been a resident of Rio de Janeiro and S. Paulo, Brazil. While in S. Paulo a very energetic young physician became interested in the study and propaganda of the science of eugenics. We invited him to give a lecture at our association building, which he did. As a result of his interest, an organization has been formed in the interest of eugenics, and its membership is composed of one hundred of the leading physicians in the city.

I am very anxious to foster this sincere effort, and appeal to you for suggestions and help. In what way can your organization advance the interest of the science through that organization?

I should appreciate your coöperation. Cordially yours,

ARTHUR W. MANUEL,
International Committee of Young Men's Christian Associations,
347 Madison Ave., New York.

GROWING MEDICINAL PLANTS IN AMERICA[1]

ALLERTON S. CUSHMAN, Ph.D.
Lieutenant Colonel, Ordnance Department, N. A.
Formerly Director, The Institute of Industrial Research, Washington, D. C.

MODERN warfare may be roughly divided into two distinct phases: one is destructive and the other reconstructive. There are no longer crucial battles which decide the issue of war as at Waterloo or Gettysburg, but there is instead one protracted and unceasing effort to destroy the enemy's life and property on the largest scale possible. Nevertheless, the reconstructive work must follow the destructive on an equally gigantic scale. Never before in the history of mankind has such organization existed for the first-aid and subsequent treatment of the sick and wounded, and never before has there been such concentrated human and animal suffering calling for alleviation.

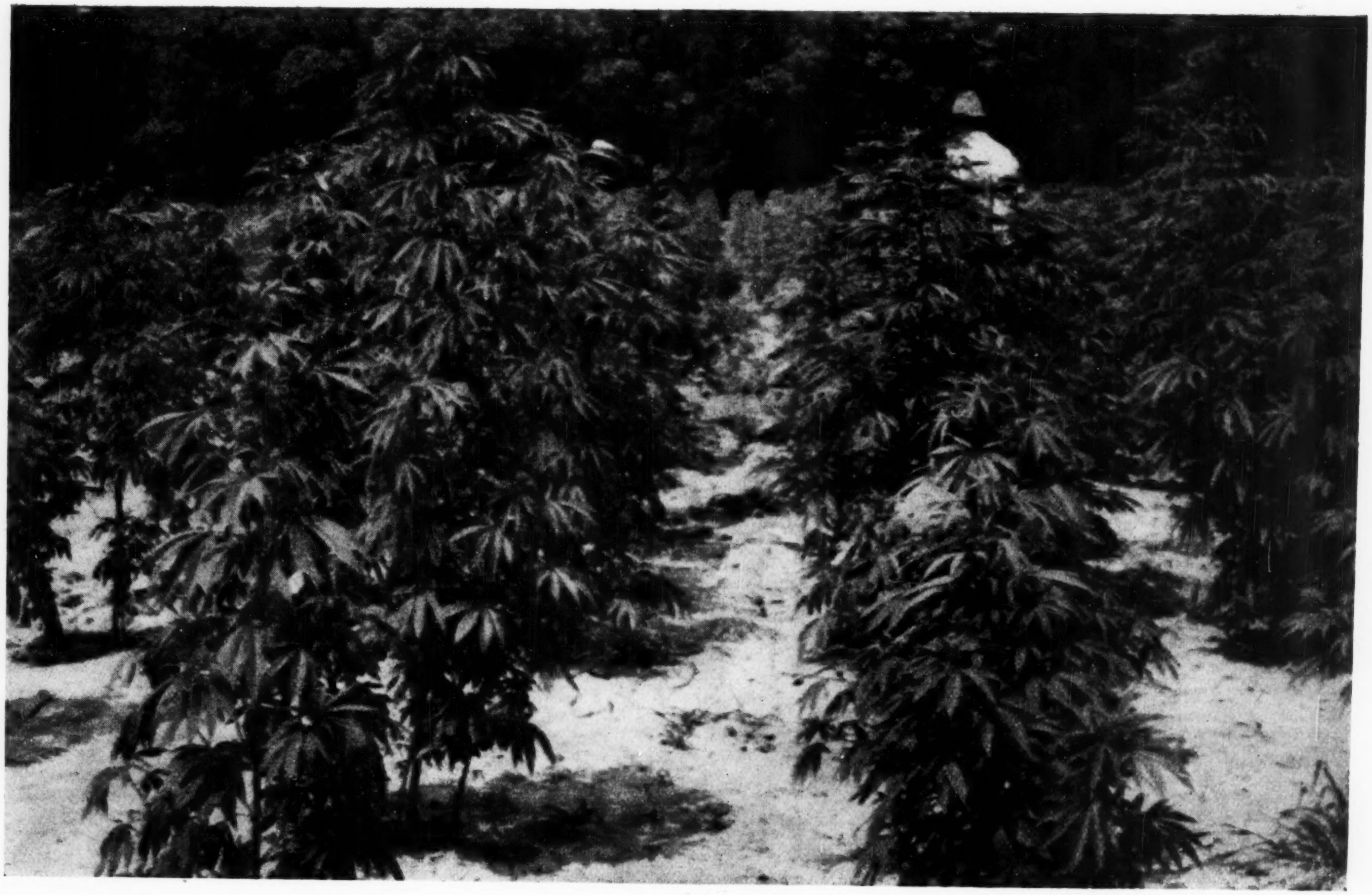
It is a curious dispensation of Providence that man first found, and still to a very large extent depends for his remedial and anesthetic agencies on, the familiar herbs and weeds which grow wild about his woods, fields and hedgerows. The term "drug" includes all substances used as medicines, as well as those substances which may be misused as intoxicants or anesthetics. Drugs may be mineral, such as the bromides, iodides, and chlorates of potassium, the mercurial, arsenical, and silver compounds and many others. In addition to these, modern medicine depends largely on the coal-tar derivatives, among which may be mentioned some of the more familiar, as, for instance, acetanilid, phenacetin, and the various salicylates, under such trade names as aspirin and salol, owned and exploited before the war exclusively by the Germans. The present paper, however, concerns itself particularly with the raw materials from which such medicinal agents as the alkaloids and glucosides are extracted. These are represented by morphine, cocaine, strychnine, atropine, quinine, digitalin, strophanthin aloin, etc., which are extracted from crude drugs imported into this country from overseas.

It is, however, more particularly the botanical drugs which can be grown under proper scientific control in the United States which we shall consider. Among these we find the following important medicinal plants: Aconite, belladonna, and stramonium, the principal source of atropine, digitalis (foxglove), cannabis indica or Indian hemp, the active principal of which is known in India as hashish, the properties of which the elder Dumas so beautifully misdescribes in "The Count of Monte Cristo."

Among our native medicinal plants we also use in fairly large quantity henbane, rhubarb, senna, gentian, golden seal (hydrastis), senega, mandrake, bloodroot, arnica; ajowan seeds, and monada punctata, used in the manufacture of thymol, a specific in the treatment of the hookworm disease, and many others too numerous to mention. If a layman, unaccustomed to the study of such subjects, were to pick up one of the great New York commercial daily newspapers which quote prices in the drug markets and were to glance over the items quoted he would probably be very much astonished at the familiar herbs, roots, and flowers which

[1]Reprinted from the *Journal of The Franklin Institute*, September, 1918, with additional comment by the author on the present situation.

HARVESTING DIGITALIS LEAVES



A FIELD OF CANNABIS

are made a matter of almost daily barter and sale, the manifold uses of which constitute some of the mysteries of our enormous patent medicine industry. There are warehouses in the heart of New York City filled with great bales of things familiar to our childhood days: cornsilk, daisy tops, red clover tops, laurel leaves, skunk cabbage, flagroot, burdock, dandelion, gentian, lily-of-the-valley, wintergreen, and many another of our old friends of the fields and woods. The inquirer might also be surprised to learn that these familiar things command a price varying from cents to dollars per pound and he might even solemnly determine to turn his newly acquired knowledge to profitable purposes and forthwith embark in the combination of business and pleasure of producing and purveying herbs and simples. Unfortunately, however, for this laudable ambition, it would soon become apparent that the labor involved, for instance, in gathering two bales of green corn silk or something else which shrinks to one bale on drying is quite inadequately paid for by the prices offered by the stony-hearted buyers in the New York market. In fact, it would probably be learned that, although America produces more corn silk or something else than all of the rest of the world together, from time out of mind the baled corn silk or something else has been imported from overseas, where child-labor laws are unknown and where people's wives, mothers, and grandmothers are more interested in acquiring a few extra pennies a day by working in the fields than they are in acquiring a vote.

Seriously speaking, the production of medicinal herbs in America depends very largely on the labor cost, and can be made a profitable enterprise only when it is conducted on a scientific basis and on a sufficiently large scale to absorb the high cost of the labor involved in the tilling, planting, cultivating, harvesting, curing, and packing operations. At the same time, the drug grower faces a most uncertain and precarious market for his wares, for, although his drug plants are needed, the need is strictly limited, and the slightest overproduction is either entirely unsalable or salable at a price less than the cost of production.

A well-known authority on drug growing, Mr. H. C. Fuller, has recently said in effect: "The cultivation and marketing of drugs must be done under an entirely different set of conditions than those obtaining in the growing and selling of vegetables. Much that has been published on the subject is misleading, and the idea that the ordinary farmer can successfully grow drug plants and produce a marketable article is ridiculous. It can be confidently asserted that if the ordinary farmer should undertake the growing of drug plants it would result in failure to him as well as discredit to the efforts of those who are specializing in the subject."

Dr. W. W. Stockberger, the expert of the United States Department of Agriculture, in charge of drug and poisonous plant investigations, expresses the same fact is the following words:[2]

"If medicinal plant cultivation is to succeed in this country it must be placed on a sound commercial basis, and there are good reasons for believing that this end will not be attained by encouraging a large number of persons to engage in drug growing on a small scale." . . . "If the drug manufacturer is to become permanently interested in medicinal plants produced in this country he must be assured of a fairly large and dependable source of supply. For this reliance must be placed upon well-equipped growers who have sufficient capital to carry on the enterprise effectively."

Still another writer on this subject has recently published the following comments:[3] "In the strictly pharmaceutical field the shortage of crude drugs has been felt more or less keenly since 1914, and much misinformation and little information of value have

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[2] *The Druggists' Circular,* January 18, p. 5; *ibid.*, March 18, p. 106.
[3] *Journal Franklin Institute,* vol. 185, No. 3, p. 435.

PLANTING BELLADONNA SEEDLINGS AT THE RATE OF SIXTY TO THE MINUTE

These are planted at the rate of sixty to the minute. Belladonna and digitalis have to be propagated in a greenhouse during the winter in order that the plants, when set out, will be large enough to cope with the ravages of insects and crowding out by weeds. (Fig. 16.)

been circulated on the subject. Stocks of many crude drugs have been exhausted, and the cultivation of medicinal plants has not as yet assumed any great proportions in the United States. Those drugs which were obtained from Europe were not cultivated, but grew wild there. It was therefore a simple matter to have them gathered and prepared for market at comparatively small cost. The cultivation of medicinal plants in the United States requires expert labor, the production of artificial conditions of soil and moisture in order to provide as nearly as possible the conditions under which the plants grow in their native habitat, and considerable investment of money. Drug plants have been raised on an experimental scale by the Government and in the drug gardens of various colleges, but it is a very different undertaking to raise them on a commercial scale. American growers of crude drugs were confronted with the necessity of increasing the value of the plants in order to overcome the high cost of cultivation. It was soon found that cross-pollination would not produce plants containing more active constituents than they do normally, but by careful selection of seed it has been possible to increase the amount of active constituents in such plants as belladonna, digitalis, etc., to three or four times what the Pharmacopoeia requires. Furthermore, advanced methods of harvesting these plants have made it possible to secure three or four harvestings in one season, whereas in former years one or two was the limit."

The experience gained by the author in the production of certain drug plants extending over the past three years confirms the statements of the experts quoted above. The fact is very clearly brought out that the so-called "back-yard" movement, however much it may stimulate vegetable gardening and poultry raising, is not applicable to the growing of medicinal plants. The U. S. P. requirement for dry belladonna herb or leaf calls for an assay showing a content of not less than 0.3% atropine alkaloid. Any substantial quantity of active constituent in excess of this prescribed minimum should, if the producer is aware of it, be credited in the price paid by the consumer. The small producer can have no knowledge of the assay value of his product unless he employs the services of a chemical laboratory. Such chemical assays require special highly paid experts in order to obtain accurate results, and the cost of such service is naturally high. In the opinion of the writer, unless a producer is able to hold his belladonna to an assay value at least twice as strong as the U. S. P. requirement, it would not be worth producing at all under American conditions. Such high-potency crude drugs can be obtained only by the application to the problem of trained scientific knowledge. Plant breeding through seed selection and a knowledge of just the day to harvest when the alkaloidal content is at the maximum, together with proper control of the drying operations, constitute a large part of the secret of success. All this necessarily hangs upon the results of laboratory investigation, which must go on hand in hand with the agricultural operations. The author and his associates have produced belladonna in bulk running almost 1% alkaloid-atropin.

Other important medicinal crops, such as digitalis and cannabis, present a special problem, inasmuch as the active constituents are not determinable by chemical assay, but depend upon certain specific physiological tests which require the services of another group of trained specialists.

In marketing crude drugs the pharmacopoeial requirements must be met, no matter how irrational these may be. The requirement on cannabis calls for the dried flowering tops of unfertilized pistillate or female plants only. This specification requires that before the male plants pollinate experts must go over the entire crop, plant by plant, and distinguish and destroy every male individual. Immediately the visible crop shrinks approximately 50%, and also adds to its cost of production the cost of this wholesale weeding operation. This requirement also necessitates the seed gardens being remote enough from the main crop to prevent wind-blown pollen from reaching the female survivors. In order to test the necessity for this requirement, the author, in coöperation with Mr. H. C. Fuller, gathered from the seed gardens flowering male tops, which were dried, powdered, and bottled. This sample, together with a pharmacopoeial sample bearing distinguishing numbers but no other information, was sent to the physiological laboratory of the Harvard Medical School. The report showed the male sample was the more physiologically active of the two. Although the pharmacopoeial requirement is probably a survival of some superstition originating in India, the drug-plant grower is held rigidly to it, and it is extremely unlikely that any buyer would purchase the crude drug in the powdered form, as the dried flowers must be present so that inspection will detect the presence of male plants. If such specifications are annoying to the commercial drug grower, they would be found intolerable by an ordinary farmer who might otherwise feel inclined to undertake the production of this special crop.

All medicinal plants are intensely poisonous to animals, but, curiously enough, most of them are very attractive to predatory insects. Possibly insects share with man a weakness for certain things that would better be let alone. However this may be, the author has determined by actual experi-

ment that the flea beetle consumes about 5% of every crop of belladonna grown, in spite of the most liberal use of insecticides and agricultural spraying machinery.

Henbane, the crude drug from which hyoscyamine is made, sells at about $4 a pound on the dry basis, and is worth it, owing to the eagerness with which insects appear to lie in wait for every green shoot as it appears. In the course of the author's experience potatoes were grown in the neighborhood of henbane, in the hope that it would act the part of a decoy crop. Unfortunately, however, the potato beetles preferred the henbane, and—if we may be permitted to drop into the vernacular—returned to their own homes only after all the other places were shut up.

Among the medicinal plants which the author and his associates have attempted to grow commercially in Virginia and Maryland, many of them successfully, are belladonna, digitalis, cannabis, sage, hydrastis, ginseng, stramonium, monada punctata, pinkroot, valerian, senega, colchicum, etc. Of these, the first two have to be propagated in a greenhouse during the winter in order that the plants, when set out in the field, will be large and vigorous enough to cope with the ravages of insects and crowding out by weeds. The greenhouse soil has to be especially sterilized to prevent the spread of a special fungoid root-rot disease to which belladonna is especially susceptible and which follows the seedlings from the greenhouse to the open fields. During one season the writer lost over 50% of his belladonna crop, due to root-rot. So suddenly did the disease show itself that on one day the bushy plants, about two feet high, were flourishing in the field and the next day were found wilted down and dying. The roots of belladonna are rich in atropine and are usually dug up and sold after a succession of leaf crops have been gathered, so that the loss from root-rot is most discouraging and baffling.

This paper has not attempted to discuss drugs or drug growing in their technical aspects, but merely describes a few of the conditions and difficulties encountered by a group of associates who entered the field with no expectation of making large profits, but with the patriotic purpose of demonstrating, if possible, that American methods were capable of making us independent of central Europe with respect to some very necessary medicinals.[4]

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[4]The results obtained during the harvest year of 1918 fully justified the careful work of seed selection that has been carried on during the past years, as the active principles in the various crops mentioned were kept up to the standard aimed at. This result was obtained in spite of the fact that not only was the labor situation during the war year extremely acute, necessitating paying higher wages to inefficient and ignorant labor than were previously paid to expert labor, but also the weather conditions during the summer season of 1918 rendered the handling of special crops very difficult. In the early spring there was a long rainy period which held back plowing and setting of plants, and this was followed by an extensive drought which lasted for twelve weeks, both conditions being unfavorable to agricultural operations. In addition to this, supplementing what has been previously touched upon in the preceding article in regard to the relation between the successful growing of medicinal plants and insect attack, it may be recorded that during August of this year a flight of a peculiar and unusual kind of potato beetle appeared upon the scene and attacked the belladonna, consuming a considerable quantity of the crop before the new insect was recognized and measures put into effect to control it. In addition to the usual medicinal plants, the growing of which has been described in this article, several new crops were produced in a small way, which had not heretofore been successfully grown and marketed in this country. This development work, it is hoped, will be carried on from year to year as opportunity of success seems to promise.

A LABORATORY MANUAL FOR GENETICS[1]

COURSES in genetics have been on the rapid increase in the last few years, but the subject is so new that they have scarcely yet crystallized into any very definite form or content as given in different institutions. With the fuller growth and rounding-out of the subject, however, and with the advent of more suitable texts, there is evidently a tendency toward a more definite order in the presentation of at least the more elementary facts. The value of laboratory work to supplement that of the classroom has doubtless been appreciated by all who have taught genetics, but here the selection of the most suitable exercises has been even more difficult than a choice of material for lecture presentation. Obviously, for an understanding of Mendelian inheritance, nothing else is so valuable to the student as the actual performing of experiments involving crosses, and the study of dominance, segregation, recombination, and other such phenomena, in at least the first and second filial generations. Fortunately, the very characteristics that have made Drosophila the form *par excellence* for genetic research, make it also well adapted for laboratory class purposes. This fact has been recognized by numerous teachers of genetics in this country, who have been making use of Drosophila in connection with their elementary teaching for some years. It is accordingly not surprising to find that breeding experiments with the "vinegar fly" form the backbone of the course in this the pioneer of laboratory manuals in genetics.

It seems somewhat presumptuous to attempt to give an estimate of a manual of directions without first having tried them out in practice, even by one who has been giving much of the same work to his own classes. The old proverb asserts that the real test of a pudding is not to be gained by inspection, but by chewing the string; this is even more true of laboratory manuals than of puddings, and there has been no opportunity to apply the string test in the present case. Nevertheless, one may, perhaps, be allowed to hazard an opinion on the basis of parallel experience.

The principal experiments outlined on Drosophila are along obvious lines, and are designed to illustrate normal Mendelian inheritance, sex-linkage, and mono and dihybrid ratios. Experiment VI involves the question of factor groups (corresponding to the chromosome pairs), but no experiment on the degree of linkage of two factors in the same group is given. The advisability of including this in an elementary course may, without doubt, be questioned, but where as much time can be devoted to the course as in this one, it might, perhaps, well be offered at least as a substitute. The character differences selected for the breeding experiments are well chosen, and a feature that will doubtless appeal to those who give the work to successive classes of elementary students is the provision of alternate characters for each exercise, which can be substituted from year to year. Two alternatives are given with each exercise.

The suggestive work on variation in plants is based on readily accessible material, and the suggestion of having the student prepare an herbarium of variation is a good one where such material

[1] Genetics Laboratory Manual, by E. B. Babcock and J. L. Collins. First edition, xi + 56 pp. McGraw-Hill Book Company, Incorporated; New York, 1918.

is available. The work often comes at such a time, however, in most of the northern states, that dependence would have to be placed largely on greenhouse material.

Seasonal restrictions and lack of greenhouse facilities will also probably limit in many cases what can be accomplished in the way of having the student perform actual experiments in plant Mendelism; but while the directions in this respect cannot, perhaps, often be adopted as they stand, they are very suggestive and should help an ingenious instructor to work out practicable plans to meet his own conditions. The suggestion of having F_1 seed that the student can plant in order to study segregation is a good one. This will work out particularly well, for example, with green and purple-stemmed Daturas, since the segregation of stem color can, in this case, be observed in the seedlings, and these can be raised in large numbers in a short time in small germinating pans in an ordinary room.

The feasibility of giving the work on plant hybridization (practice in cross-pollination) will again depend on facilities and other conditions. The selection of types would be difficult to improve, but it would perhaps have added much to the usableness of this section if illustrations had been supplied, showing the instruments to be employed, and the methods of performing the operations.

Practical work in animal breeding (aside from that on Drosophila) is even more difficult to bring into a regular laboratory course than is work with plants. The suggestions along this line deal with registry methods with cattle, a subject which is, in most agricultural colleges, included in the course in Animal Husbandry. It is important, of course, that students interested in genetics in relation to agriculture should get this knowledge, but it would seem that it would have been well to include also some training in the methods of keeping breeding records more particularly for genetic uses.

Putting out a laboratory manual, particularly in a new field, is a somewhat precarious venture, since every instructor is likely to have his own ideas as to material and methods! or at any rate, as previously mentioned, he is likely to be limited by his available facilities and the condition under which his work must be given. It would, therefore, be somewhat hazardous to venture an opinion as to how completely these directions can be adopted without modification, but the reviewer has no hesitation in saying that any teacher of genetics, whether or not he has previously been offering a laboratory course, will find the manual full of useful suggestions. In places, in fact, it would appear to be addressed more directly to the instructor than to the student. Nevertheless, if it helps to stimulate, as no doubt it will, the institution of laboratory work in connection with courses in genetics, where such work has not previously been given, it will serve a most useful purpose.

L. J. C.

The Basis of Crop Reports

The Bureau of Crop Estimates, United States Department of Agriculture, maintains 199,384 voluntary crop reporters, to whom schedules of inquiry regarding crop and live-stock conditions are forwarded periodically. These schedules are tabulated and averaged.

The data thus collected and compiled, supplemented by reports from the field service, constitute the basis of the monthly and special crop reports of the bureau.

RACE MIXTURE IN HAWAII

By Vaughan MacCaughey
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THE CHINESE

THE Hawaiian Islands are remarkable for the diversity of races represented and for the varied conjugal race-mingling which has taken place in this tiny island world during the past hundred and fifty years. Excellent general accounts of the nature of Hawaii's population can be found in W. F. Blackman's "The Making of Hawaii" (Macmillan, 1906, 266 pp.) and in "Race Mingling in Hawaii," by Ernest J. Reece (*American Journal of Sociology*, 20:104-16, July, 1914).[1] The present paper is the first of a series of eugenic studies of Hawaii's polyglot and polychrome population, a series which embodies data not heretofore assembled and made available for students of eugenics.

The population of Hawaii, 1918, in round numbers is as follows:

Asiatics		153,500
Japanese	105,000	
Chinese	23,000	
Koreans	5,000	
Filipinos	20,000	
Polynesians		40,000
Hawaiians	23,000	
Caucasian-Hawaiians	11,000	
Chinese-Hawaiians	6,000	
Latins		31,000
Portuguese	23,000	
Spanish	2,000	
Porto Rican	6,000	
Americans, Scotch, British, Germans, Russians, etc.		22,000

The Hawaiians are remnants of the splendid Polynesian stock that formerly solely possessed this lovely mid-Pacific archipelago. The Americans, North Europeans and other "white men" represent the traders, missionaries, beachcombers, sailors, fugitives from justice, merchants, sugar planters, professional, military and capitalistic classes that have completely dominated and exploited the life and resources of the islands. All of the other races—Japanese, Chinese, Korean, Filipino, Spanish, Portuguese, Porto Rican, Russian, Negro, South Sea Islanders, etc.—have been *imported* wholesale by the agricultural corporations to work in the sugar-cane fields. At present the population of Hawaii is predominantly Asiatic, alien, male, illiterate, non-English-speaking, non-Christian, landless, and homeless.

The Chinese have been associated with Hawaii since very early times. The first epoch in Hawaii's industrial exploitation was the "Sandalwood Period," during which an active trade was carried on with China. Chinese coolies began to be imported in small numbers about 1870. The flood of coolie labor swelled rapidly and reached a maximum about 1870. The exclusion law, which went into effect with annexation in 1898, has decreased the number of Chinese immigrants. The immigration of foreign-born Chinese into Hawaii to 1910 has been as follows:

Previous to 1890	6,580
1891–1895	3,340
1895–1900	3,830
1900–1905	445
1905–1910	205

The Chinese now number 23,000; the increase during the past decade has been slight. There are now 800 registered Chinese voters in Hawaii. In 1900 there were almost as many Chinese children (1,300) in the public and pri-

[1] See also Vaughan MacCaughey, "Americanization and the Schools of Hawaii," in School and Society, 8: 24-26, July 6, 1918, and "Racial Elements in Hawaii's Schools, in Education," in press.

vate schools as Japanese (1,350). The Chinese, however, have increased only to 4,000, whereas there are now 15,000 Japanese children. Chinese form 10% of the total school population; the Japanese form 40%. Only 2,000 of the Chinese in Hawaii are now working on the sugar plantations. Reece states: "The Chinese in Hawaii are all from Quantung and largely from Canton. They exhibit, therefore, the racial characteristics of the southern Chinese, being short, dark-skinned, and suggestive of Malay extraction. Their mental traits are those of the Chinese in general. They are plodding, thrifty, inveterate workers, content with simple living, stolid, and capable of excelling in those activities which involve memory and imitation rather than originality."

Table I (see Appendix) shows the racial elements involved in all Chinese marriages in Hawaii during the five-year period 1913–1917. Accurate data are not available for earlier years, but the essential facts concerning race mixtures would be substantially the same if records covering a longer period were available. The data are from the official records of the Territorial Board of Health.

MARRIAGES OF CHINESE

The racial preferences shown by the Chinese men may be grouped as follows: 58% chose Chinese wives, 10% chose wives of mixed Chinese blood, 20% chose Hawaiian wives, 14% chose wives of mixed Hawaiian blood. None married Korean women, and only 4 married Japanese women. Of the 613 matings, 425 married Asiatics, 167 married Polynesians, and 14 married Caucasians. Nearly all of the Chinese women married Chinese men. Seven married Chinese-Hawaiians, 6 married Americans, and 4 married Hawaiians. Only 1 married a Korean, and only 2 married Japanese.

Nearly all of the Chinese-Hawaiian men selected wives with Hawaiian blood, either pure Hawaiian, Caucasian-Hawaiian, or Chinese-Hawaiian. Only 7 out of 173 married Chinese women. None married Japanese, Koreans, or Filipinos. Eight married Portuguese. The Chinese-Hawaiian women likewise selected, or were selected by, men of Hawaiian, Caucasian-Hawaiian, or Chinese-Hawaiian blood. Fifty-nine were married by Chinese men, 15 by Americans, and 15 by Portuguese.

Of the 240 Chinese-Hawaiian women 97 married Asiatic husbands, 109 Polynesian husbands, and 32 got Caucasian husbands.

CONCLUSIONS

Over half the Chinese men marry Chinese women, while most Chinese women marry Chinese men. A large percentage of the Chinese men marry Hawaiian or part-Hawaiian women. Very few Chinese women marry Hawaiian or part-Hawaiian men.

FEW MARRIAGES WITH AMERICANS

Only one Chinese man has married an American woman; a few Chinese women have been married by American men.

An appreciable amount of mingling has taken place between the Chinese and the Portuguese; Chinese and Chinese-Hawaiian men marry Portuguese, Spanish, Hawaiian, Caucasian-Hawaiian, etc. Chinese-Portuguese men and women marry Portuguese, Spanish, Hawaiian, Caucasian-Hawaiian, etc. There is remarkably slight mingling between Chinese and Japanese or Koreans. A few Chinese men have married Japanese women, and a few Chinese-Hawaiian women have been married by Koreans. There have been a few marriages of Americans and North Europeans with Chinese and Chinese-Hawaiian women; the Caucasian mingling is chiefly through the Caucasian-Hawaiian, who intermarry freely with the Chinese and Chinese-Hawaiians.

The most significant feature is the large number of mixed marriages, in which the Chinese, Hawaiian, and Caucasian strains intermingle. Reece states: "There seems to be no reason to doubt that the mixing will proceed at a mod-

erate rate. This does not, of course, mean that Hawaii will be given over to the Caucasian-Hawaiian-Chinese race. The Japanese are predominant numerically, and promise to remain so. The Portuguese constitute a bulky element. Both are prolific, and neither contributes considerably to the fusion. What is likely to appear is the gradual growth of the new stock, fitting itself for leadership in the minor business and clerical activities of the islands."

JAPANESE AND KOREANS

Nearly one-half of the total population of Hawaii is foreign-born. Of the 110,000 foreign-born population, about 70% are Japanese, about 15% are Chinese, and the remainder are Koreans, Filipinos, etc. Asiatics comprise *over five-sixths* of the total foreign-born population. The Japanese are racially dominant in Hawaii today, and will doubtless so continue for many decades. They are very fertile, and have already reached the point of comprising over 40% of the total school population. There are now over 15,000 Japanese children in the schools; in 1900 there were only 1,300. The Japanese population numbers 106,000, or *nearly one-half* the total population of the territory. It consists largely of alien males. The Japanese have been the backbone of Hawaii's extremely profitable corporation cane-sugar industry. At present there are only 26,000 Japanese at work on the sugar plantations. Most of the Japanese were imported before annexation to supply the demand for cheap field labor. Immigration began about 1886, and since that date there has been a large and steady stream of alien laborers coming into Hawaii from Japan. Extensive immigration is taking place *at the present time,* in the form of "picture brides," who rapidly become the mothers of prospective "American citizens." The Japanese have increased 23,000 in seven years, both by birth and immigration.

The immigration of foreign-born Japanese into Hawaii for a typical series of years has been as follows (see also appendix):

Previous to 1890	3,330
1891–1895	4,340
1896–1900	16,390
1901–1904	10,350
1905	3,180
1906	8,240
1907	9,205
1908	3,070
1909	1,070

The tourist upon coming to Hawaii is impressed by the large numbers of Japanese women employed in domestic service. As a class these women are attractive, intelligent, clean, polite, and serviceable. They wear Japanese clothes, and are always picturesque and neatly attired. The American-born Japanese girls usually wear American clothes.

During the past decade there has been a heavy influx of Japanese women into Hawaii, chiefly as "picture brides." Statistics for a typical five-year period show Japanese women immigrants as follows:

Year	*As laborers*	*As non-laborers*	*As "picture-brides"*[2]
1912	1,447	77	
1913	2,130	95	1,572
1914	1,842	217	1,407
1915	1,126	232	1,050
1916	1,157	151	909

The picture brides are selected in Japan by intermediaries or middlemen upon requisition by the Japanese in Hawaii who desire a wife. Two ceremonies take place, one in Japan, in the absence of the husband; the second at the Immigration Station in Honolulu, according to American law. These

[2] These numbers are duplicates, also included in the other two columns.

brides-to-be are almost without exception plantation laborers, and they so state when they arrive.

In general the Japanese women have large families, are able to nurse their babies (as many American women in Hawaii are not), take good care of their children, dress them in American clothes when they begin to go to school, and establish homes that compare favorably with other immigrant people of similar economic and social grade.

Upon comparison with the table of Chinese marriages and intermarriages, given in the Appendix, Tables I and III. it will be noted that there is little tendency on the part of the Japanese to amalgamate with the Hawaiians, whereas the Chinese have contributed largely to the formation of the Chinese-Caucasian-Hawaiian mixture. Neither do the Japanese marry as freely with the Portuguese as the Chinese have done.

THE KOREANS

The importation and immigration of foreign-born Koreans into Hawaii up to 1910 has been as follows:

Previous to 1901	65
1901–1904	3360
1905	590
1906–1910	145

There are now about 5,000 Koreans in Hawaii, mostly alien males. During the five-year period, 1913–1917, 404 Korean men married and 311 Korean women married. It is noteworthy and most extraordinary that all of the women, without exception, married Korean men. The women of *no other race* in Hawaii have a like record for tenacious adherence to racial lines. The women of no other race have married only men of their own race. The Korean men have "out-married" to a considerable degree, as witnessed by the tables (see Appendix, table V):

CONCLUSIONS

In general, Japanese marry only Japanese; they show remarkable racial allegiance, more so, as a race, than any other in Hawaii. A few Japanese men have married Hawaiian, part-Hawaiian, and Portuguese women; only one has married an American woman. There are surprising few marriages between the Japanese and the other Asiatic peoples in Hawaii; a few Japanese women have been married by Chinese and Koreans. In general, Asiatics in Hawaii breed more freely with Caucasian stock than they do among themselves. All the Korean women have married only Koreans. The Korean men have married not only Koreans but also women of Hawaiian and part-Hawaiian blood.

The Japanese and Koreans contrast strongly with the Chinese in race mixtures, the former groups evincing strong clannishness in marital selections: the latter groups freely breeding "out."

APPENDIX

Race Mixture in Hawaii

(See article on page 41)

Table I shows the racial elements involved in all Chinese marriages in Hawaii during 1913-1917:

TABLE I

Nationality of mate—wife or husband	Chinese		Chinese-Hawaiian		Chinese-Portuguese	
	Men	Women	Men	Women	Men	Women
Total marriages	613	382	173	240	5	5
Chinese	359	359	7	59	0	0
Chinese-Hawaiian	59	7	27	27	0	0
Chinese-Filipino	1	0	0	0	0	0
Chinese-Japanese	1	0	0	0	0	0
Japanese	4	2	0	1	0	0
Jap-Hawaiian	0	1	0	1	0	0
Korean	0	1	0	5	0	0
Korean-Hawaiian	0	0	0	1	0	0
Filipino	1	0	0	4	0	0
Hawaiian	140	4	82	72	0	1
Caucasian-Hawaiian	27	1	47	36	1	1
Spanish	1	0	0	0	1	0
Portuguese	11	0	8	15	2	1
Porto Rican	7	0	0	0	0	0
Norwegian-Portuguese	0		0	0	1	0
American	1	6	0	15	0	0
British	0	0	0	0	0	1
Swede	0	0	0	0	0	1
Russian	1	0	1	0	0	0
Austrian-German	0	1	0	2	0	0

One marriage of Chinese-Hawaiian man with Chinese-Japanese woman.
One marriage of American man with Chinese-American woman.

Table II shows graphically, so far as records are available, the relation of Japanese to the population as a whole:

TABLE II

Year	Total population	Japanese	Born in Japan	Born in Hawaii
1860	67,000			
1866	63,000			
1868	.....	148	148	
1872	56,900			
1878	58,000			
1882	73,000			
1884	76,000	116		
1889	.....	8,400		
1890	95,246	12,360	.....	902
1896	109,020	24,407	.....	2,078
1899	134,953	42,376		
1900	154,001	61,111	56,230	4,881
1908	172,000	72,000		
1909	175,000	75,000		
1910	191,909	79,674	59,785	19,889
1911	200,000	80,000		
1912	210,000	80,366		
1913	217,744	83,100		
1914	227,391	89,715		
1915	231,210	91,490		
1916	237,623	97,000		
1917	250,627	102,479	.....	30,000 (estimated)

Table III shows the marital relations of the Japanese in Hawaii:

TABLE III

Year	*Males*	*Females*	*Males to 100 females*
1890	10,079	2,281	490
1900	47,508	13,603	349
1910	54,783	24,891	220
1918 (estimated)	62,000	40,000	155

It will be noted that during this period, 1890-1918, the number of males has increased 500%, the number of females 3,800%; there is still a large disparity between numbers of males and females.

Table IV shows the racial elements involved in all Japanese marriages in Hawaii during the five-year period 1913-1917. Accurate data are not available for earlier years, but the essential facts would be substantially the same for a longer period. The data are from the official record of the Territorial Board of Health:

TABLE IV

Nationality of mate	Japanese		Jap-Hawaiian		Jap-Portuguese	
	Men	Women	Men	Women	Men	Women
Total marriages	7,671	7,647	8	2	1	3
Japanese	7.627	7,627	0	0	0	1
Jap-Portuguese	1	0	0	0	1	0
Chinese	2	4	1	0	0	0
Korean	0	5	0	0	0	1
Filipino	0	1	0	0	0	0
Hawaiian	27	2	3	0	0	0
Chinese-Hawaiian	1	0	1	0	0	0
Caucasian-Hawaiian	4	2	3	1	0	0
Portuguese	8	0	0	1	0	1
Spanish	0	1	0	0	0	0
American	1	2	0	0	0	0
British	0	1	0	0	0	0

One American man married a German-Japanese woman.

TABLE V

Nationality of wife	*Korean men*
Korean	311
Japanese	5
Chinese	1
Filipino	3
Hawaiian	52
Chinese-Hawaiian	5
Caucasian-Hawaiian	2
Portuguese	9
Spanish	10
Porto Rican	2
German	1

One Korean-Hawaiian man married a Chinese-Hawaiian woman.

APPLIED EUGENICS

By

PAUL POPENOE

Editor of the Journal of Heredity (Organ of the American Genetic Association), Washington, D. C.

and

ROSWELL HILL JOHNSON

Professor in the University of Pittsburgh

"The results of all the trustworthy observations and experiments have been taken into account . . . This book should command the attention not only of students of sociology, but, as well, of philanthropists, social workers, settlement wardens, doctors, clergymen, educators, editors, publicists, Y. M. C. A. secretaries and industrial engineers. It ought to lie at the elbow of law-makers, statesmen, poor relief officials, immigration inspectors, judges of juvenile courts, probation officers, members of state boards of control and heads of charitable and correctional institutions. Finally, the thoughtful ought to find in it guidance in their problem of mating. It will inspire the superior to rise above certain worldly ideals of life and to aim at the family success rather than an individual success."—*From the introduction by Edward Alsworth Ross, Professor of Sociology in the University of Wisconsin.*

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